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09/745,044	12/20/2000	Hiroyasu Murata	FUJH 18.100	7948

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EXAMINER	
WILLIAMS, LAWRENCE B	

ART UNIT	PAPER NUMBER
2638	

DATE MAILED: 08/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/745,044	MURATA, HIROYASU	
	Examiner	Art Unit	
	Lawrence B Williams	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Remarks, filed 22 April 2005, with respect to the rejection(s)of claim(s) 1, 5, 7, 9, 10-12, 14-15 and 2-4 6, 8, under USC 102(e) and USC 103, respectively, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Seki (6,259,729 B1), Pessoa (US Patent 6,535,552 B1), Chaffee et al. (US Patent 5,117,418) and Goldston et al. (US Patent 6,292,511 B1)

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of **50** to **150** words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

3. The disclosure is objected to because of the following informalities: On page 14, lines 18 and 20, applicant makes reference to "block 130" in Fig. 1. Examiner is unable to find such a reference numeral in Fig. 1.

Appropriate correction is required.

Claim Objections

4. Claim 9 is objected to because of the following informalities: Examiner suggests applicant replace the word "equalized" with "equalizer" in line 4 of the last paragraph of the claim. Appropriate correction is required.

5. Claim 12 is objected to because of the following informalities: Examiner suggests applicant replace the phrase "FF" with "FFT" in line 5 of the last paragraph of the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claim 13 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 13 attempts to claim a mathematical algorithm which is defined as non-statutory subject matter.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

9. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention. Applicants cites the limitation "and outputs the pattern to a channel" in lines 4 and 5 of the claim. It is unclear as to which pattern applicant is referencing since applicant makes prior reference to both a training and synchronization pattern in lines 3 and 4 of the claim.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 3 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Seki (US Patent 6,259,729 B1).

(1) With regard to claim 3, Seki discloses in Fig(s). 1, 2, a coefficient update method for the time domain equalizer (col. 9, lines 20-26) of a DMT system, which uses multi-carrier modulation (col. 1, lines 13-22), comprising; a step of calculating the response characteristics of a channel and those of said time domain equalizer from the output of an FFT (1380) at a subsequent stage of said time domain equalizer (col. 10, lines 35-49) and a step of calculating a coefficient of said time domain equalizer to minimize the errors of said response characteristics using the LMS (col. 15, lines 36-40).

(2) With regard to claim 4, Seki also discloses in Fig. 2, the coefficient update method for the time domain equalizer according to claim 3, wherein, said step of calculating said coefficient

comprises; a step of calculating a convolution coefficient (1370) to minimize the errors of said response characteristics using the LMS (col. 15, lines 36-43); and a step of updating the coefficient of said time domain equalizer using said convolution coefficient (col. 10, lines 26-49).

12. Claim 14 is rejected under 35 U.S.C. 102(e) as being anticipated by Goldston et al. (US Patent 6,292,511 B1).

Pessoa discloses in Fig. 3, a coefficient update method for a time domain equalizer (TEQ) wherein the coefficient of the TEQ is updated by a signal after a cyclic prefix of a synchronous signal is removed. Pessoa's method removes a guard interval (cyclic prefix) (151) from first and second signal representative of an in-phase (148) and quadrature (130) signal component (both synchronous signals), applied to an FFT (153), and then used to update an equalizer coefficient (186).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pessoa (US Patent 6,535,552 B1) in view of Shoji et al. (US Patent 5,303,263).

(1) With regard to claim 1, Pessoa discloses in Fig. 4, a coefficient update method (34)

for a time domain equalizer of a DMT system which uses multi-carrier modulation (col. 1, lines 5-10), comprising: a step of calculating the response characteristics of a channel and those of said time domain equalizer (20) from the output of said time domain equalizer (Fig. 4) during a training period (col. 7, lines 6-15) and updating the coefficient of said time domain equalizer (col. 10, lines 10-14).

Pessoa does not however a step of calculating the characteristic parameters of a channel and those of said time domain equalizer from the output of said time domain equalizer using a synchronization signal during a data period and updating the coefficient of said time domain equalizer.

However, Shoji et al discloses in Fig. 1A, a step of calculating the response characteristic of a channel and those of said time domain equalizer from the output of said time domain equalizer according to the synchronization pattern of a training period and of a data period (Fig(s) 2A, 2B; col. 1, line 63 - col. 2, line 7), and updating the coefficient of said time domain equalizer (col. 10, lines 5 – 23).

It would have been obvious to one skilled in the art at the time of invention to combine the teachings of Shoji et al. with the invention of Pessoa as a method of providing an optimum sequence estimator which promotes rapid convergence (col. 8, lines 2-13).

(2) With regard to claim 2, Pessoa also discloses the coefficient update method for the time domain equalizer according to claim 1, wherein said coefficient update step has a step of calculating the coefficient of said time domain equalizer to minimize the errors of said response characteristic using a least mean square (LMS) method (col. 7, lines 20-29).

15. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki US Patent 6,259,729 B1 in view of Shoji et al. (US Patent 5,303,263).

(1) With regard to claim 5, Seki discloses in Fig. 12, a receive method (400) of a DMT system, which uses multi-carrier modulation (col. 1, lines 6-11), comprising; a time domain equalizer step of equalizing receive signals in the time domain (420); a step of performing FFT (430) processing on the output of said time domain equalizer; a step of performing frequency domain equalizer processing (440) on said FFT-processed output; a step of decoding (450) the output of said frequency domain equalizer. Seki does not however disclose a step of calculating the response characteristic of a channel and those of said time domain equalizer from the output of said time domain equalizer according to the synchronization pattern of a training period and of a data period, and updating the coefficient of said time domain equalizer.

However, Shoji et al discloses in Fig. 1A, a step of calculating the response characteristic of a channel and those of said time domain equalizer from the output of said time domain equalizer according to the synchronization pattern of a training period and of a data period (Fig(s) 2A, 2B; col. 1, line 63 - col. 2, line 7), and updating the coefficient of said time domain equalizer (col. 10, lines 5 – 23).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teaching of Shoji et al. with the invention of Seki as a method of providing an optimum sequence estimator which promotes rapid convergence of an estimated impulse response of a transmission channel with a minimum amount of computation (col. 8, lines 9-13).

(2) With regard to claim 6, Shoji et al. also discloses the receive method according to claim 5, wherein said coefficient update step comprises a step of calculating the coefficient of

said time domain equalizer to minimize the errors of said response characteristic using a least mean square (LMS) method (col. 4, lines 16-29) as one of the well-known adaptive algorithms in the art used to adapt the taps of filters in both the time and frequency domain.

16. Claims 7, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki US Patent 6,259,729 B1 in view of Chaffee et al. (US Patent 5,117,418).

(1) With regard to claim 5, Seki discloses in Fig. 12, a receive method (400) of a DMT system, which uses multi-carrier modulation (col. 1, lines 6-11), comprising; a time domain equalizer step of equalizing receive signals in the time domain (420); a step of performing FFT (430) processing on the output of said time domain equalizer; a step of performing frequency domain equalizer processing (440) on said FFT-processed output; a step of decoding (450) the output of said frequency domain equalizer. Seki does not however disclose a step of calculating the response characteristic of a channel and those of said time domain equalizer from the output of said time domain equalizer from the output of said FFT, and updating the coefficient of said time domain equalizer.

However, Chaffee et al. discloses a frequency domain adaptive echo canceller for a full-duplex data transmission where he discloses a step of calculating the response characteristics of a channel (abstract) and those of an echo canceller from the output of an FFT at a subsequent stage of said echo canceller and updating the coefficient of echo canceller (col. 6, lines 18-26).

It would have been obvious to one skilled in the art at the time of invention to apply the method of Chaffee et al. to the invention of Seki so that filter coefficient updating could be done

as a function of signal-to-noise ratio in a small frequency band associated with each filter coefficient to improve adaptation optimization of the invention (col. 9, lines 1-9).

(2) With regard to claim 8, Seki also discloses the receive method according to claim 7, wherein said coefficient update step further comprises a step of calculating the coefficient of said time domain equalizer to minimize the errors of said response characteristics using a least mean square (LMS) method (col. 15, lines 36-40). Though Seki discloses the frequency domain LMS, it is well known in the art of the use of the LMS in the time domain as well.

17. Claims 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki (US Patent 6,259,729 B1) in view of Chaffee et al. (US Patent 5,117,418) and further in view of Shoji et al. (US Patent 5,303,263).

(1) With regard to claim 9, Seki discloses in Fig. 12, a DMT system, which uses multi-carrier modulation (col. 1, lines 6-11), comprising; a channel (200); a transmitter (300) which performs multi-carrier modulation on a training pattern during a training period (col. 9, lines 40-46) and outputs the pattern to a channel; a receiver (400) which performs multi-carrier demodulation on receive signals from said channel, wherein said receiver equalizes said received signals in the time domain using a time domain equalizer (420); performs FFT (430) processing on the output of said time domain equalizer; then equalizes said FFT-processed output in the frequency domain using a frequency domain equalizer (440).

Seki does not explicitly teach multicarrier modulation on a training pattern and on a synchronization pattern during a data period or calculating the response characteristics of the channel and those of said time domain equalizer from the output of said time domain equalizer

according to the training and synchronization pattern, updates the coefficient of said time domain equalizer.

However, Shoji et al. teaches a digital mobile communication system wherein he discloses modulation on a training pattern and on a synchronization pattern during a data period (Fig. 2A) and calculating the response characteristics of the channel and those of said time domain equalizer from the output of said time domain equalizer according to the training and synchronization pattern (col. 1, line 63 - col. 2, line 8), updates the coefficient of said time domain equalizer (col. 10, lines11-19).

It would have been obvious to one skilled in the art at the time of invention to apply the method of Shoji et al. with the invention of Seki a as a method of providing an optimum sequence estimator which promotes rapid convergence (col. 8, lines 2-13).

(2) With regard to claim 11, Seki discloses in Fig. 12, a DMT system, which uses multi-carrier modulation (col. 1, lines 6-11), comprising; a channel (200); a transmitter (300) which performs multi-carrier modulation on a training pattern during a training period (col. 9, lines 40-46) and outputs the pattern to a channel; a receiver (400) which performs multi-carrier demodulation on receive signals from said channel, wherein said receiver equalizes said received signals in the time domain using a time domain equalizer (420); performs FFT (430) processing on the output of said time domain equalizer; then equalizes said FFT-processed output in the frequency domain using a frequency domain equalizer (440).

Seki does not explicitly teach multicarrier modulation on a training pattern and on a synchronization pattern during a data period or calculating the response characteristics of the channel and those of said time domain equalizer from the output of said time domain equalizer

according to the training and synchronization pattern, updates the coefficient of said time domain equalizer.

However, Shoji et al. teaches a digital mobile communication system wherein he discloses modulation on a training pattern and on a synchronization pattern during a data period (Fig. 2A) and calculating the response characteristics of the channel and those of said time domain equalizer from the output of said time domain equalizer according to the training and synchronization pattern (col. 1, line 63 - col. 2, line 8), updates the coefficient of said time domain equalizer (col. 10, lines11-19).

It would have been obvious to one skilled in the art at the time of invention to apply the method of Shoji et al. with the invention of Seki a as a method of providing an optimum sequence estimator which promotes rapid convergence (col. 8, lines 2-13).

18. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki (US Patent 6,259,729 B1) in view of Chaffee et al. (US Patent 5,117,418).

Seki discloses in Fig. 12, a DMT system, which uses multi-carrier modulation (col. 1, lines 6-11), comprising; a channel (200); a transmitter (300) which performs multi-carrier modulation on a training pattern (col. 9, lines 40-46) and outputs the pattern to a channel; a receiver (400) which performs multi-carrier demodulation on receive signals from said channel, wherein said receiver equalizes said receive signals in the time domain by a time domain equalizer (420); performs FFT (430) processing on the output of said time domain equalizer; then equalizes said FFT-processed output in the frequency domain using a frequency domain equalizer (440).

Seki does not however teach calculating the response characteristics of said channel and those of said time domain equalizer from said FFT-processed output, and updates the coefficient of said time domain equalizer.

However, Chaffee et al. teaches in Fig(s) 1, 2, a frequency domain adaptive echo canceller for a full-duplex data transmission where he discloses a step of calculating the response characteristics of a channel (abstract) and those of an echo canceller from the output of an FFT at a subsequent stage of said echo canceller and updates the echo canceller (col. 6, lines 18-26).

It would have been obvious to one skilled in the art at the time of invention to apply the method of Chaffee et al. to the invention of Pessoa so that filter coefficient updating could be done as a function of signal-to-noise ratio in a small frequency band associated with each filter coefficient to improve adaptation optimization of the invention (col. 9, lines 1-9).

19. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki US Patent 6,259,729 B1 in view of Chaffee et al. (US Patent 5,117,418).

Seki discloses in Fig. 12, a DMT system, which uses multi-carrier modulation (col. 1, lines 6-11), comprising; a channel (200); a transmitter (300) which performs multi-carrier modulation on a training pattern (col. 9, lines 40-46) and outputs the pattern to a channel; a receiver (400) which performs multi-carrier demodulation on receive signals from said channel, wherein said receiver equalizes said receive signals in the time domain by a time domain equalizer (420); performs FFT (430) processing on the output of said time domain equalizer; then equalizes said FFT-processed output in the frequency domain using a frequency domain equalizer (440).

Seki does not however teach calculating the response characteristics of said channel and those of said time domain equalizer from the output of said FFT, and updates the coefficient of said time domain equalizer.

However, Chaffee et al. teaches in Fig(s) 1, 2, a frequency domain adaptive echo canceller for a full-duplex data transmission where he discloses a step of calculating the response characteristics of a channel (abstract) and those of an echo canceller from the output of an FFT at a subsequent stage of said echo canceller and updates the echo canceller (col. 6, lines 18-26).

It would have been obvious to one skilled in the art at the time of invention to apply the method of Chaffee et al. to the invention of Pessoa so that filter coefficient updating could be done as a function of signal-to-noise ratio in a small frequency band associated with each filter coefficient to improve adaptation optimization of the invention (col. 9, lines 1-9).

20. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pessoa (US Patent 6,535,552 B1) in view of Goldston et al. (US Patent 6,292,511 B1).

Pessoa discloses in Fig(s) 4-6, a coefficient update method for a time domain equalizer (TEQ) wherein the coefficient of the TEQ is updated by a signal. He does not however disclose the TEQ updated by a signal after a cyclic prefix of a synchronous signal is removed.

However, Goldston et al. discloses in Fig. 3, a TEQ updated by a signal after a cyclic prefix (guard interval) of a synchronous signal is removed.

It would have been obvious to one skilled in the art at the time of invention to initialize the teaching of Goldston in the invention of Pessoa as a method of providing an improved equalization method (col. 2, lines 45-58).

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Kaku et al. discloses in US Patent 4,571,733 Automatic Equalization Device And Method of Starting-Up The Same.

b.) Johnson et al. discloses in US Patent 6,047,025 Method And Apparatus For Equalization In An Asymmetric Equalization In An Asymmetric Digital Subscriber Line Communications System.

c.) Goldston et al. discloses in US Patent 6,532,258 B1 Method For Estimating Signal-To-Noise Ratio Of Digital Carriers In An AM Compatible Digital Audio Broadcasting System.

d.) Hartup et al. discloses in US Patent 6,295,317 B1 Method And Apparatus For Demodulating And Equalizing An AM Compatible Digital Audio Broadcast Signal.

e.) Molnar et al. discloses in US Patent 5,995,568 Method And Apparatus For Performing Frame Synchronization In An Asymmetrical Digital Subscriber Line (ADSL) System.

f.) Shoji et al. discloses in US Patent 5,303,263 Transmission Channel Characteristic Equalizer.

g.) Wu discloses in US Patent 6,389,062 B1 Adaptive Frequency Domain Equalizer Circuits, Systems, And Methods For Discrete Multitone Based Digital Subscriber Line Modem.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on 571-272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams

lbw
August 10, 2005

EMMANUEL BAYARD
PRIMARY EXAMINER